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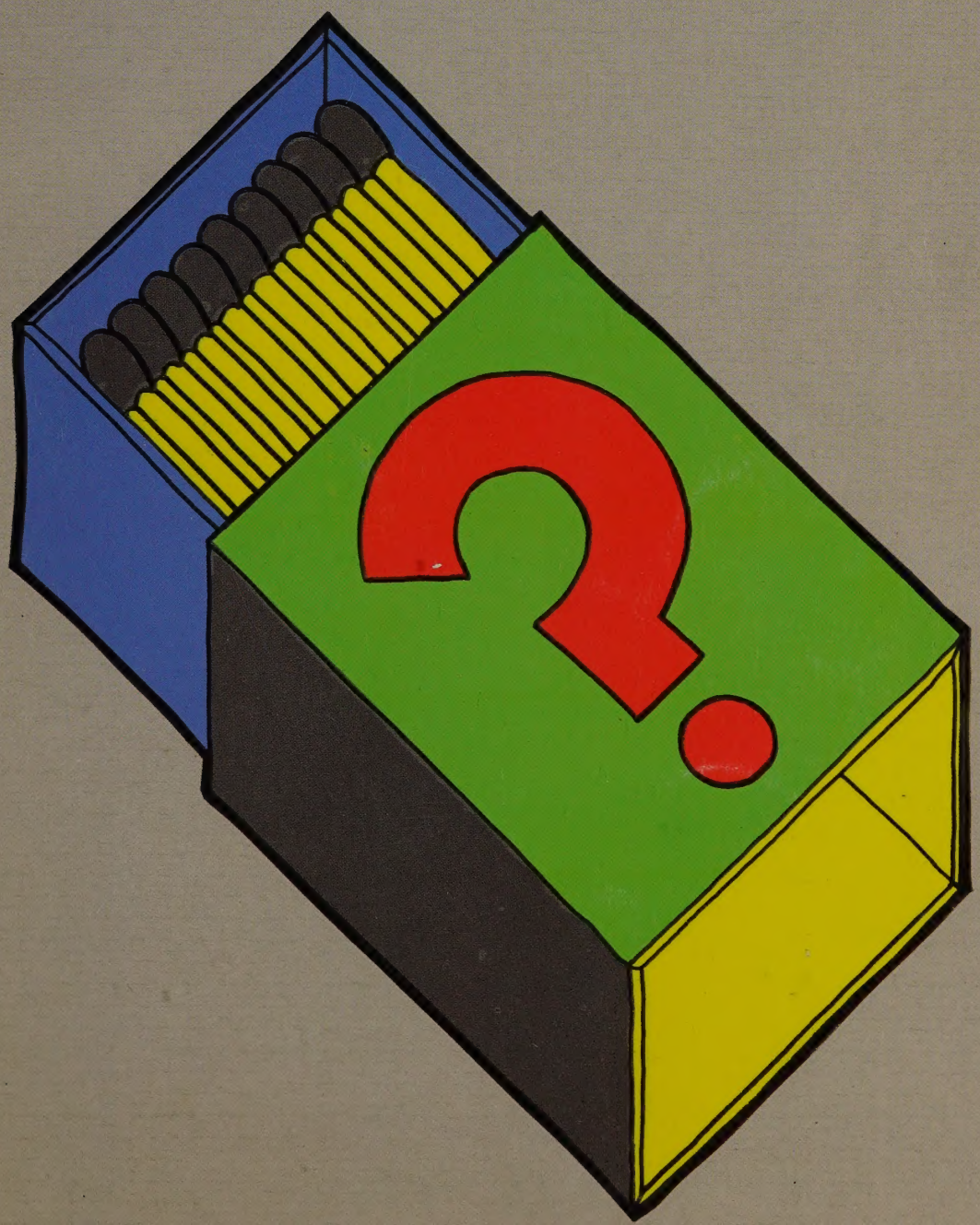
Department of Health and Social Security
and the Welsh Office

Health
Technical
Memorandum 86

FIRECODE

Assessing Fire Risk in Existing Hospital Wards



Department of Health and Social Security
and the Welsh Office

FIRECODE

Assessing Fire Risk in Existing Hospital Wards

London Her Majesty's Stationery Office

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FIRECODE brings together in one comprehensive suite of documents the Department's policy and technical guidance on fire precautions in hospitals and other NHS premises.

Basic policy, principles and key management guidance are contained in *Firecode: Policy and Principles.* Other *FIRECODE* documents include the *Health Technical Memoranda* '80' series (which give technical guidance on various building, engineering and equipment issues) and the *Fire Practice Notes* series (dealing with various specialist aspects of fire precautions) and Nucleus guidance. Existing HTMs will, in due course, be reissued in *FIRECODE* format. The suite includes *Firecode: Directory of Fire Documents* which lists references to relevant legislation and relevant fire precautions guidance issued by non-DHSS sources (as, for example, the Home Office).

For the convenience of the user, a *FIRECODE* binder and slip case are available for the storage of the constituent *FIRECODE* documents. The binder includes details of the publications which make up *FIRECODE.*
The *FIRECODE* binder, reference ISBN 0 11 321097 3, is available from HMSO Books, PO Box 276, Nine Elms Lane, London SW8 5DT.

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Assessing Fire-Risk In Existing Hospital Wards

1. Scope and Purpose

1.1 This technical memorandum provides a method of evaluating the fire safety of patient areas within existing hospitals. The evaluation scheme offers a systematic form of appraisal by awarding points for the level of fire safety achieved by each component in the patient area. A comparison can thus be made against an acceptable score and those hospitals which fall below the acceptable standard can be identified.

1.2 It is evident that any patient area of a hospital which falls well below a reasonable level of fire safety, and thus constitutes an ever-present risk to both patients and staff, should be identified at an early stage in order that the necessarily limited funds available in the NHS for other than direct patient care services can be applied for the greatest benefit. Spending such funds as become available on the indiscriminate provision of additional fire doors, compartmentation or alarm systems may prove ineffective and wasteful if a proper appraisal of need has not been carried out.

1.3 How does the system work? The assessment is made quite simply by completing a set of twenty worksheets, one for each relevant component affecting the fire safety of a patient area in an existing hospital. A patient area would usually be a ward (nursing section) which means the accommodation and spaces for a group of patients normally the responsiblity of a charge nurse/sister. The scores from each of the twenty worksheets are subsequently entered onto a summary sheet and by simply applying the percentage contribution to fire safety of each component, an overall score for the patient area is revealed.

1.4 The assessment of each patient area should take approximately one hour to complete and it is suggested that the surveys should be carried out jointly by the health authority's Specialist Fire Prevention Officer and the Works Officer.

1.5 The Home Office Draft Guide to Fire Precautions in Hospitals (referred to throughout this document as "the Draft Guide") outlines the standard of fire safety which might be required if hospitals were designated under the Fire Precautions Act 1971. The Draft Guide has been used as the basis for the evaluation scheme and constitutes a common standard against which all scores are ultimately measured.

1.6 It is expected that health authorities using the WIMS system of computerised management information will use the system to build up an overall ongoing record of fire-safety in the authorities' estate.

2. How The Evaluation Procedures Were Derived

2.1 The twenty independent components of fire safety were derived from an analysis of the Draft Guide. They were chosen as constituting the essential elements of fire safety and a list of sub-components was developed for each one. The analysis was carried out by the National Fire Policy Advisory Group under the guidance of Edinburgh University Department of Fire Engineering.

2.2 To assess the overall standard of fire safety in a patient area, it is necessary to determine the relative contribution made by each component. To do this the general question of fire safety was considered at 5 separate levels which progressively contribute to carrying out the objectives of the Government's fire safety policy. These levels are:-

Level 1 - Fire Safety Policy	: Course or general plan of action adopted by a government to achieve security against fire and its effects.
Level 2 - Fire Safety Objectives	: Specific goals to be achieved (i.e. life safety, minimum disruption of hospital function, property protection etc).
Level 3 - Fire Safety Tactics	: Fire safety options, each of which contributes wholly or partly to the fulfilment of the objectives (i.e. fire prevention, ignition control, refuge, escape, rescue).
Level 4 - Fire Safety Components	: Individual elements of fire safety identified in established codes and standards.
Level 5 - Fire Safety Sub-Components	: Detailed aspects of fire safety which when grouped together become the essential parts of a component.

2.3 The progression upwards from level 5 to level 1 can be readily appreciated. Each of the components at level 4 which are identified below has a contribution to make to some or all of the fire safety tactics. These in turn have a value to contribute to one or all of the objectives and the fulfilment of all the objectives would achieve the desired aims of Government fire safety policy.

2.4 The relative contribution of each component to all levels of fire safety has been considered carefully and the following table lists each component and its percentage contribution to the attainment of fire safety as defined by the Draft Guide.

No	Component	% Contribution
1	Staff	9
2	Patients and Visitors	6
3	Factors Affecting Smoke Movement	7
4	Protected Areas	6
5	Ducts, Shafts and Cavities	4
6	Hazard Protection	7
7	Interior Finish	5
8	Furnishings	6
9	Access to Protected Areas	4
10	Direct Escape to Outside	4
11	Travel Distance	5
12	Stairways	5
13	Corridors	5
14	Lifts	3
15	Communication Systems	5
16	Signs and Fire Notices	4
17	Manual Fire Fighting Equipment	3
18	Escape Lighting	5
19	Automatic Suppression	3
20	Fire Brigade	4

3. How To Perform The Evaluation Procedures

3.1 When assessing a patient area, each of the twenty components of fire safety must be considered separately. Detailed worksheets giving guidance on reaching an appropriate grading and listing the sub-components (level 5 above) are provided in this document. The worksheets describe these sub-components as 'factors' which assist in completing the assessment.

3.2 The components have been divided into four groups in the worksheets and have been arranged so that similar aspects of fire safety are dealt with together. The first two components (Staff and Patients and Visitors) assess the occupants of the patient area and are considered first as they represent the largest potential contribution to fire safety. Then follow six components which assess the shape, size and construction of the patient area. The first three of these (Factors Affecting Smoke Movement, Protected Areas, and Ducts, Shafts and Cavities) consider the quality of refuge offered, and the next three (Hazard Protection, Interior Finish and Furnishings) assess the degree of resistance to ignition and spread of fire. The next six components (Access to Protected Areas, Direct Escape to Outside, Travel Distance, Stairways, Corridors and Lifts) assess the ease of movement to refuge or escape. The final six components (Communication Systems, Signs and Fire Notices, Manual Fire Fighting Equipment, Escape Lighting, Automatic Suppression and Fire Brigade) consider the provision of active fire precautions.

3.3 Each worksheet describes the method to be adopted in reaching a performance assessment and where necessary mentions aspects of the component which have caused some difficulty during field trials and repeatability tests. No attempt has been made to describe all the sub-components for each worksheet but only to offer sufficient information to clarify uncertainties of meaning or application.

3.4 After giving careful consideration to the performance of each component using the appropriate worksheet, the individual scores should be entered on the Survey Summary Sheet. The simple multiplication of the survey grades for each component by its percentage contribution to fire safety will give an overall score between 0 and 500 for the patient area. This score is a measure of how far short the patient area falls of 100% conformity with the principles of the Draft Guide. A score of 500 indicates no deficiency, 400 a 20% deficiency, and so on until 0 which represents a 100% deficiency. An example of a completed summary sheet is included on page 4.

4. Levels of Acceptability

4.1 Although any score of less than 500 for a patient area indicates a measure of fire safety inadequacy compared with a common standard, it is important to determine when the level of inadequacy becomes acceptable. Through a series of field trials and repeatability tests, this level has been set at 350 with scores greater than this being considered as acceptable and scores at this level or below indicative of an unacceptable degree of fire safety. A score of 280 or below is considered definitely unacceptable.

4.2 When deciding in which category a patient area should be placed, it is important to bear in mind the limits of accuracy within which the survey will have been conducted. Scores around 350 or around 280 must therefore be treated as indicating borderline situations. The scale of acceptability can be illustrated as follows:-

500	
	GOOD
450	
	ACCEPTABLE (Low Risk)
350	
	UNACCEPTABLE (Medium Risk)
280	
	DEFINITELY UNACCEPTABLE (High Risk)
0	

4.3 When considering the improvements necessary to a patient area which is 'definitely unacceptable', it can be seen that it is not sufficient to simply raise it

above 280, and so into the 'unacceptable' category. Any planned improvements should ensure that the area would score above 350 and so fall into the 'acceptable' zone.

5. Multiple Volume Assessment For A Hospital Building

5.1 The principal objective of the evaluation scheme is to enable patient areas within a hospital to be compared in terms of fire safety. In addition, it may also be useful to combine the scores of a number of patient areas in a 'multiple volume assessment' for a particular hospital or building. Although the worksheets are suitable only for the patient areas of a building, they include a consideration of potential hazards from non-patient areas, so buildings containing other departments as well as wards can be covered. The score derived from the survey sheets is a measure of the fire safety level which exists in the patient areas, but there is no assessment of the actual numbers of patients and staff. In the comparative evaluation of individual patient areas the numbers involved are not important but, when a whole building is being assessed, these must be incorporated to evaluate the average safety level. Therefore the scores for each patient area are first multiplied by the number of beds for each patient area (this being a simple measure of maximum occupancy), before they are added together. The total figure should then be divided by the total number of bedspaces within the building to give a figure between 0 and 500 which measures the average level of fire safety for the occupants of the building, or group of buildings surveyed. For example:

Patient area 1 : 30 beds : score 350
Patient area 2 : 28 beds : score 244
Patient area 3 : 12 beds : score 364

Score for total building

$$= \frac{(30x350)+(28x244)+(12x364)}{30+28+12}$$

$$= 310$$

6. Making Improvements

6.1 Where a patient area survey has revealed an unacceptable level of fire safety, it will be possible to identify components within the patient area which need improvement to achieve an overall level of acceptability. The most efficient method of selecting which of those components can make the best contribution to an overall increase in the survey score is by considering their percentage share of the total. For convenience the components are listed below in percentage contribution order:-

Component	% Contribution
Staff	9
Factors Affecting Smoke Movement	7
Hazard Protection	7
Patients and Visitors	6
Protected Areas	6
Furnishings	6
Interior Finish	5
Travel Distance	5
Stairways	5
Corridors	5
Communication Systems	5
Escape Lighting	5
Ducts, Shafts and Cavities	4
Access to Protected Areas	4
Direct Escape to Outside	4
Signs and Fire Notices	4
Fire Brigade	4
Lifts	3
Manual Fire Fighting Equipment	3
Automatic Suppression	3

6.2 The grades obtained by the twenty components indicate those which are particularly deficient, and the relative values attached to each component show which will offer the greatest potential for an increase in fire safety. For example, a one point increase in the grade for Staff is equivalent to a three point increase in the grade for Manual Fire Fighting Equipment. A link between potential improvements is a very attractive proposition but a cost benefit analysis of this kind would involve too many additional variables, market factors and local influences. A simple system which can be used to gauge the costs could be developed by individual assessors to calculate, for their own hospitals, the basic costs of improving sub-components to give the desired overall improvement. Such costs will vary from area to area and it is impracticable to specify them at this stage. The worksheets should help the surveyor to determine what would be necessary to raise the score to an 'acceptable' level and to prepare a series of alternative methods of achieving such an increase. These could then be costed to determine which gives the best value for money.

7. Conclusion

7.1 The prime objective of this evaluation scheme is to give the assessor a systematic technique which is simple to operate so that the level of fire safety existing in any patient area can be assessed and compared with a level of acceptability, the highest level being obtained by a scrupulous and complete compliance with the Draft Guide.

7.2 It is also possible by combining the assessments of fire safety levels in adjoining patient areas and applying the method described in paragraph 5.1 to calculate an approximate level of safety for a hospital building. This would enable health authorities to determine their priorities on a comparative basis when allocating funds for fire safety purposes.

7.3 Another advantage of the evaluation scheme is that the relative contributions of different components to fire safety in conjunction with an estimate of 'unit costs' can help to identify the most cost-effective package of improvements.

7.4 A valuable consequence of the adoption of the evaluation scheme will be the establishment of a uniform method of assessing fire safety standards across the country. This should ensure that each health authority can easily identify those hospitals where a low standard exists, and be reasonably sure that an 'acceptable' standard has been achieved after the improvements have been completed.

Survey Summary Sheet (completed example)

Health Authority :
Hospital : VICTORIA
Patient Area : WARD 1
Floor Level(s)* : FIRST FLOOR
Date of Survey : 1/10/87
Surveyed by : A.N.OTHER AND M.E.ALSO
Number and Type of Beds : 30 GERIATRIC

Component	Grade	% Contribution	
1. Staff	0 1 2 3 4 5 x	9	=27
2. Patient and Visitors	0 1 2 3 4 5 x	6	=12
3. Factors Affecting Smoke Movement	0 1 2 3 4 5 x	7	=21
4. Protected Areas	0 1 2 3 4 5 x	6	=30
5. Ducts, Shafts and Cavities	0 1 2 3 4 5 x	4	=16
6. Hazard Protection	0 1 2 3 4 5 x	7	=35
7. Interior Finish	0 1 2 3 4 5 x	5	=15
8. Furnishings	0 1 2 3 4 5 x	6	=18
9. Access to Protected Areas	0 1 2 3 4 5 x	4	=16
10. Direct Escape to Outside	0 1 2 3 4 5 x	4	=16
11. Travel Distance	0 1 2 3 4 5 x	5	=15
12. Stairways	0 1 2 3 4 5 x	5	=25
13. Corridors	0 1 2 3 4 5 x	5	=25
14. Lifts	0 1 2 3 4 5 x	3	=15
15. Communication Systems	0 1 2 3 4 5 x	5	=10
16. Signs and Fire Notices	0 1 2 3 4 5 x	4	=12
17. Manual Fire Fighting Equipment	0 1 2 3 4 5 x	3	=12
18. Escape Lighting	0 1 2 3 4 5 x	5	=10
19. Automatic Suppression	0 1 2 3 4 5 x	3	=0
20. Fire Brigade	0 1 2 3 4 5 x	4	=20
	TOTAL SCORE (out of 500)		=350

ADDITIONAL COMMENTS:

* For the purposes of this survey, any floor which has a direct access from an area situated at the same level to which the fire brigade vehicular access is available, should be considered to be at ground level.

Worksheet 1
Staff

Definition of Component

Includes only those staff allocated specifically to the patient area. The presence of other staff can be regarded as a fortuitous factor of safety.

Method

Make an initial assessment based on the observed ratio of staff to patients at the time of the survey, awarding points as follows:-

Ratio of better than 1 staff to 4 patients	= 4 to 5
Ratio of 1 staff to 4-6 patients	= 3 to 4
Ratio of 1 staff to 6-8 patients	= 2 to 3
Ratio of 1 staff to 8-10 patients	= 1 to 2
Ratio of more than 1 staff to 10 patients	= 0 to 1

This initial assessment can be modified depending on your evaluation of the following factors:-

A. the staffing levels at other times of the day or night

B. the potential abilities of the staff in an emergency including: experience and status, ability to communicate in English, physique, knowledge of the patient area involved and modes of evacuation

C. the fire training of staff including the frequency of fire fighting and evacuation drills in which they participate

D. the ability of the staff to supervise the whole of the patient area, and the extent to which this might be affected by the temporary absence of staff.

It must be emphasised that the dominant element is the actual staff to patient ratio at the time of the survey, and not any 'normal' or 'usual' ratio. The initial points assessment will be modified up or down if factors A to D are above or below average. An accurate assessment of all these factors presents obvious difficulties but in deciding whether overall performance requires modification for above or below average factors, you must exercise your judgement on the basis of the known facts and qualities of the staff concerned.

Worksheet 2
Patients and Visitors

Definition of Component

Patients are those occupants receiving treatment in the patient area. Visitors are those people visiting patients and who may affect the evacuation procedures.

Method

Make an initial assessment based on the mobility of the patients as follows:-

Patients able to walk without assistance	= 4 to 5
Patients able to walk if assisted	= 3 to 4
Patients needing blanket or mattress evacuation	= 2 to 3
Patients requiring bed evacuation	= 1 to 2
Patients who should not be moved	= 0 to 1

In many patient areas there will be a mixture of patients with varying degrees of mobility and the initial assessment will need to reflect the proportion in each category. This initial assessment can be modified depending on your evaluation of the following factors:-

A. the psychological condition of the patients.

B. the ability of visitors to assist or impede evacuation of patients. This will depend on visiting times, ages and physical abilities of those likely to affect the evacuation and how well they know the escape routes.

C. the likely increase in fire hazard due to smoking

D. the responsiveness of patients to instructions (eg consider sedation and the ability to communicate in English).

This component has the same form of assessment as Staff (sheet 1) but here the dominant element is patient mobility. This will be modified by factor B if the number of visitors to the patient area is such as to significantly assist (eg in the case of a paediatric ward where parents are actually staying with their children) or impede the evacuation (eg a geriatric ward where there is open visiting with a large proportion of aged or infirm visitors). Factor C on smoking requires an assessment of the increase or decrease in risk due to the rules on smoking in the patient area. It should be remembered that a total ban can actually increase the risk due to the surreptitious use of cigarettes and lack of ash trays.

Worksheet 3
Factors Affecting Smoke Movement

Definition of Component

This component comprises constructional elements which affect air movement in the patient area.

Method

Make an initial assessment of what may be termed the "leakiness" of the area ie the potential for air movement from outside to inside the patient area through cracks around the opening parts of windows and external doors. This can be estimated by adding the appropriate scores for windows and doors, together with a score for the fitting element as demonstrated below:-

WINDOWS: This element is derived from the total number of openable parts of all external windows in the patient area.

WINDOW SCORE Number of openable parts	Window Score
0-8	3
9-15	2
16-23	1
24 and above	0

DOORS: This element is derived from the number of doors that separate the patient area from the open air.

DOOR SCORE Number of external doors	Door Score
0-5	+1
6-10	0
11 or more	-1

SEALING SCORE: The score for this element depends on the amount of gap that allows air movement through doors and windows.

DEGREE OF SEALING	Sealing Score
Windows and doors sealed and/or weather stripped	+1
Windows and doors not weather stripped but tight fitting	0
Windows and doors badly fitting	-1

The main initial assessment for this component is by direct observation of the constructional features that contribute to the "leakiness" of the patient area. This assessment can then be modified depending upon your evaluation of the following factors:-

A. Position of the patient area in the building
B. The number of open windows and doors at time of survey
C. The direction of prevailing wind and the degree of exposure of the area
D. The degree and integrity of internal subdivisions within the patient area (eg open ward or single bed rooms)
E. The contribution of the ventilation system and any existing forms of smoke control.

Example

An example of the calculation of this component of the patient area could be:-

Initial Assessment

A first floor patient area has 10 windows each of which has 2 opening parts and 3 doors opening onto balconies. The windows and doors are tight fitting ie the moving parts are not twisted and close firmly against their respective rebates, but are not weatherstripped. The patient area is part of a 4 storey ward block and has external walls on 3 sides.

Window score	= 1
Door score	= 1
Sealing score	= 0
Therefore initial assessment	= 2

For this purpose a storey is defined as the space between the floor finish of one floor and the floor finish of the floor next above, or the roof if there is no floor above. Ground floor is that floor which corresponds with the outside ground level, and first floor that which is one storey above ground floor.

Modification Factors

The first factor (A) "Position of the patient area in the building" is part of the assessment of the exposure of the patient area to the weather, especially wind. Because of the pressures generated by wind on the surfaces of buildings, the exposed surfaces in the uppermost third of the building are subjected to higher pressures in general than the lower two-thirds of the surfaces. Therefore wind induced pressures on the surfaces of the patient area in the above example would be less than those on the surfaces of the higher storey wards. The difference in pressures developed is difficult to quantify without detailed study but in the present example an increase of 15-20% for each quarter-height of the building could be assumed.

The second factor (B) "The number of open windows and doors at the time of survey" requires an assessment of the actual number of open windows and doors at the time of the survey (and not the 'usual' or 'normal' number): the more that are open, the worse the situation.

The third factor (C) relates to the surrounding terrain and the direction of the prevailing wind. For example, a building set in open ground will be more exposed to the effects of the natural wind than a similar building in an urban area. Similarly a patient area that has a 'long' wall facing the direction of the prevailing wind will have a greater exposure than one in a different orientation. The potential degree of exposure for smoke movement increases with the degree of exposure.

The fourth factor (D) is concerned with the degree of internal sub-division within the patient area. The greater the number of divisions, the greater the number of barriers to smoke movement and the safer the area.

The fifth factor (E) requires a brief observation of the air movement pattern imposed by any powered ventilation system that serves the patient area. It may be assumed that any smoke in the patient area will be moved in the direction imposed by the ventilation system in the early stages of fire development. The operation of any existing forms of smoke control should be checked.

It is appreciated that the application of these factors in individual cases will require subjective judgements and the effect on the initial assessment may be marginal, but it is important to ensure as thorough an appraisal of the overall situation as is reasonably possible.

Worksheet 4
Protected Areas

Definition of Component

This component is designed to measure the degree of fire resistance between different patient areas and where applicable between different protected areas within the same patient area.

Method

The assessment should be based on the estimated fire and smoke resistance of the floors and walls of the patient area, using the following gradings:-

A. Floors - single story building = 2
- buildings other than single storey with floors of fire resistance of:
  - under 30 minutes = 0
  - 30-60 minutes = 1
  - over 60 minutes = 2

B. Walls - Main walls and doors of fire resistance of under 30 minutes = 0
- Main walls and doors of fire resistance of 30 minutes or over = 1
- Main walls and doors of fire and smoke resistance of 30-60 minutes = 2
- Main walls and doors of fire and smoke resistance of over 60 minutes = 3
- Patient area physically separate from all other patient areas = 3

The overall grading is simply arrived at by adding the grades for Floors and Walls as in the following example:-

A patient area other than single storey, with floors of fire resistance of over 60 minutes, and main walls and doors of fire and smoke resistance of over 60 minutes.

This gives: Floors = 2
Walls = 3
Grade = 5

A patient area is not to be confused with a compartment as defined by the Building Regulations. It may be a ward or part of a ward, but never larger than a ward.

Worksheet 5
Ducts, Shafts and Cavities

Definition of Component

Any voids which penetrate the structure (eg cavities, ducts, unprotected suspended ceilings, chutes, trunking, shafts, roof and other vents, openings in floors, and disused chimney flues) in or connecting with the patient area should be taken into account when grading this component.

Method

The impact of the following factors should first be considered:-

A. Smoke/fire spread potential:
- location
- route
- spaces penetrated or connected
- barriers penetrated
- orientation (vertical or horizontal)
- misuse

B. Protection of the duct, shaft or cavity:
- smoke/fire resistance of the walls
- internal smoke/fire control
- internal detection

Then make an assessment of the degree of fire safety by adding together the scores you consider appropriate for factors A and B as follows:-

A. Smoke/fire spread potential: high risk	= 1 or 0
low risk	= 3 or 2
minimal or no risk	= 5 or 4
B. Protection : excellent	= 5 or 4
some	= 3 or 2
minimal or none	= 1 or 0

NB Even if the combined score totals more than 5, it should be rated as grade 5.

The degree of fire safety, as with all components, is based on the assumption that a fire has started in the most dangerous situation possible -in this case in an adjacent patient area linked by ducts, shafts or cavities with the patient area.

Worksheet 6
Hazard Protection

Definition of Component

Hazards are rooms or areas which due to their function and/or contents present a greater risk of fire occurring or developing than elsewhere. They may be within the patient area or threaten it from somewhere nearby. Hazard protection is the quality of the barrier between areas of different risk and may include active suppression systems.

Method

Firstly the impact of the following factors should be considered:-

A. Nature and quantity of hazards
B. Location and quality of barriers
C. Penetration of barrier by services, doors etc
D. Management of potential hazards in the patient area.

Secondly make an assessment of the degree of fire safety by adding together the scores you consider appropriate for both hazard and protection as follows:-

A. Hazard eg. External risks include main laboratories and pharmacies, main kitchens, laundries, boiler houses, works departments and main stores.

Internal risks include materials which could burn to produce large quantities of smoke, easily ignitable materials and materials which present a risk of explosion.

Category		Grade
High risk	=	1 or 0
Low risk	=	3 or 2
Minimal or no risk	=	5 or 4

B. Protection eg. An airtight barrier in the case of materials which could burn to produce large quantities of smoke.

A one-hour fire resistant barrier in the case of large quantities of combustible materials.

Provision of blast resistance and/or venting in the case of an explosion risk.

Category		Grade
Adequate	=	5 or 4
Some	=	3 or 2
Minimal or none	=	1 or 0

NB Even if the combined score totals more than 5, it should be rated as grade 5.

The assessment of this component includes the consideration of both external and internal risks and the component is, therefore, one of those which assess the patient area in relation to the rest of the building. Factor D on the management of potential hazards is particularly important as the way a potential hazard is normally controlled can either neutralise or exacerbate the risk of fire breaking out.

Worksheet 7
Interior Finish

Definition of Component

All surface materials, other than furnishings, immediately observable in the patient area.

Method

The finish applied to the walls, partitions, ceilings and floors of all the rooms in the patient area should be assessed in terms of fire spread acceptability under the following three categories:-

Finish	'Acceptability'
A. Brickwork, blockwork, concrete, plasterboard, ceramic tiles, glazing, plaster finishes (including rendering on wood and metal laths), non flammable boards, woodwool slabs and vinyl wallpapers	= 5 or 4
B. Any other materials which have been flame retardant treated to achieve class 1 spread of flame	= 3 or 2
C. Timber, hardboard, particle board (chipboard), plastics, decorative laminates, polystyrene wall and ceiling linings, heavy flock wall-papers, fibreboard, and posters	= 1 or 0

(Gloss painted polystyrene wall and ceiling linings score 0 and should be removed).

These three groups have been derived from the appendix to the Draft Guide which lists eight separate groups. The approximate percentage of the total surface area covered by materials of each of these three groups is then multiplied by their 'acceptability' in terms of fire spread and the grade awarded for this component is the sum of these scores divided by 100. For example:

A patient area with 45 per cent of its surface having a score of 4; 40 per cent a score of 3; and 15 per cent a score of 0 has a grade equal to:

$$\frac{(45x4) + (40x3) + (15x0)}{100}$$

$$= 3$$

Worksheet 8
Furnishings

Definition of Component

All furniture and furnishings contained within the patient area.

Method

The items listed below should be considered in terms of ignition resistance using the standards prescribed in Firecode: Health Technical Memorandum 87 - Furniture, Furnishings, Bed Assemblies, Apparel and all other relevant specifications:-

A. Beds with their mattresses and bedding

B. Bed and window curtains

C. Chairs

D. Cupboards, wardrobes and clothes storage

E. Floor coverings

F. Televisions

Your assessment of the degree of ignition resistance and consequential grade for this component should be deduced as follows:-

Standard	= 5
20% below standard	= 4
40% below standard	= 3
60% below standard	= 2
80% below standard	= 1
100% below standard	= 0

Worksheet 9
Access To Protected Areas

Definition of Component

The potential for patient movement to an adjoining patient area without a significant change in level, and from which there is means of escape. (The distance to this space is assessed separately on sheet 11 and the fire resistance offered by the protected area or adjoining patient area on sheet 4.)

Method

The evaluation of this component involves a consideration of the following factors:-

A. Location of doors to adjoining patient areas

B. Width of doors (ie suitability for evacuation)

C. Capacity of adjoining patient areas to accommodate the patients, unimpeded by the evacuation of other patient areas

D. The protection, if any, offered by intermediate doors passed through en route

NB Inter-communication by means of wall hatch, kick-out panel, floor hatch or similar device is not acceptable.

Staircases cannot be considered as adjacent spaces, but staircase lobbies may be if they have sufficient capacity.

An assessment should now be made based on the proportion of all occupants who have access to an adjoining patient area or to a protected area:

91 - 100% of occupants = 5
76 - 90% of occupants = 4
51 - 75% of occupants = 3
26 - 50% of occupants = 2
11 - 25% of occupants = 1
0 - 10% of occupants = 0

In this component the persons doing the survey are asked to consider the potential for movement of staff and patients from the patient area to a protected area in the event of a fire. Such movement to safety could either lead to an eventual escape route or provide potential refuge. (Direct external escape is dealt with under Direct Escape to Outside in sheet 10.) The protected area could either be an adjoining patient area or a protected area within the same patient area, the fire resistance offered by these areas having already been considered under Protected Areas in sheet 4.

Worksheet 10
Direct Escape To Outside

Definition of Component

The potential for patient movement directly to the outside from the patient area without a significant change in level. (The distance to the outside is assessed separately in sheet 11.)

Method

The evaluation of this component involves a consideration of the following factors:-

A. Width of doors (ie suitability for evacuation)

B. Location of doors

C. Any suitable openable windows (location, number, sill height, size)

NB Escape into enclosed courtyards is only acceptable if there is a suitable exit on the other side.

An assessment should now be made based on the proportion of all occupants who have direct escape to outside.

91 - 100% of occupants = 5
76 - 90% of occupants = 4
51 - 75% of occupants = 3
26 - 50% of occupants = 2
11 - 25% of occupants = 1
0 - 10% of occupants = 0

This component is similar to Access to Protected Areas (sheet 9) in asking the persons doing the survey to assess the potential for movement of people from the patient area, but in this case it is the possibility of movement directly to an outside place of safety, without change of level. This normally means that if the patient area is above ground level it will be rated as grade 0 for this component.

Worksheet 11
Travel Distance

Definition of Component

The maximum distance to be travelled from any point in the patient area to either an adjoining patient area, a protected area, a protected stairway, or to the outside.

Method

The evaluation of this component involves a consideration of the following factors:-

A. Location of doors to adjoining patient areas

B. Location of doors to protected areas

C. Location of doors to protected stairways

D. Location of doors to the outside

An assessment should now be made of the actual maximum travel distance:

0-5m	=5
6-10m	=4
11-15m	=3
16-30m	=2
31-60m	=1
Over 60m	=0

The distance to be travelled relates directly to the appropriate grade in this assessment. The persons doing the survey are asked to measure the actual maximum travel distance from any point in the patient area to either the entry to an adjoining patient area, a protected area, a protected stairway, or the outside. The potential for movement as opposed to the distance is considered under Access to Protected Areas (sheet 9), Direct Escape to Outside (sheet 10) and Stairways (sheet 12) respectively, and the values of those components should in no way influence the assessment of this component.

Worksheet 12
Stairways

Definition of Component

The protected vertical links between the patient area and ground level which provide an escape route from the patient area. (Lifts are considered separately on sheet 14).

Method

Make an initial assessment based on the travel distance between the patient area and ground level as follows:-

Patient area on first floor = 4 or 5
Patient area on second floor = 3 or 4
Patient area on third floor = 2 or 3
Patient area on fourth floor = 1 or 2
Patient area above fourth floor = 0 or 1

NB If the patient area is at ground level or escape is possible without the use of stairways, ramps or lifts, the component is automatically rated as grade 5.

This initial assessment can be modified depending upon your evaluation of the following factors:-

A. The capacity of the stairways. They should be of sufficient width, at the correct pitch and have adequate handrails to facilitate evacuation by the method normally practised. There should be an adequate number of staircases to enable evacuation to proceed unimpeded by the evacuation of other patient areas.

B. The location of exits. Each stairway must lead directly to the outside or to a protected route leading to the outside.

C. The protection of each stairway from the weather.

D. The degree of fire resistance. Each stairway should be constructed of fire resistant materials and be separated from surrounding patient areas by a minimum of 30 minutes fire resistance.

NB: Fixed or portable ladders, chutes and lowering lines are never acceptable.

This component has the same form of assessment as Staff (sheet 1) but here the dominant element is height above ground. We are only concerned with the condition of the inside of the stairway enclosure, the distance to the stairway being under Travel Distance (sheet 11) and the access onto the stairway under Corridors (sheet 13). Factor A requires an assessment of the ability of the stairway(s) to handle the simultaneous evacuation of both the patient area and any adjoining patient areas whose occupants would also use the stairway(s) as part of their escape route. Factor D is of crucial importance as it is the existence of a 30 minute fire resistant barrier which is taken as defining the stairway as a protected route and consequently this component should be rated as only grade 0 (or possibly 1 if at first floor level) if the fire resistance is less than 30 minutes.

Worksheet 13
Corridors

Definition of Component

Corridors are any horizontal circulation routes useable by patients, not just protected areas.

Method

The following factors should firstly be considered in terms of their adequacy for evacuation in the event of fire when measured against standards derived from the Draft Guide:-

FACTOR		MEASURE OF ADEQUACY
A. Width and constancy	:	Constant width (of at least 1.2m) and direct. All doors onto and from the corridor to be a minimum width of 1.1m and suitable for prescribed method of evacuation.
B. Floor friction and slope	:	Such as not to impede evacuation by the method normally practised.
C. Doors	:	Door closers to be provided on all fire resisting doors and automatic door releases on all those which have to be kept open.
D. Fire resistance of surroundings	:	The fire resistance to be over 30 minutes and all doors to be well fitting.
E. Obstructions	:	No obstruction of circulation areas by staff bases or similar areas, and all doors to open in the direction of escape.
F. Combustible material	:	No loose combustible materials.

An assessment should now be made of the perceived adequacy of the corridors, grade 5 being completely adequate in every respect but the further from the measure of adequacy, the lower the grade until, if totally inadequate, grade 0 will be the rating. We are here concerned with the 'quality' of the corridors, the distances having already been assessed under Travel Distance (sheet 11).

Worksheet 14
Lifts

Definition of Component

This component comprises the power assisted vertical transport system(s) linking the patient area with ground level and thus providing access and escape to the outside for persons in the patient area.

Method

In the absence of a properly designed evacuation lift, patient areas will be graded 0 or 5 as follows:-

A. If the patient area contains only ambulant patients or if the patient area is at ground level with access to the outside which does not require the use of lifts, ramps or stairways, it should be rated as grade 5.

B. As normal bed or passenger lifts should not be used for evacuation in the event of a fire, if the patient area contains non ambulant patients and does not have direct access to the outside, it should be rated as grade 0.

It should be noted that DHSS has developed a specification for escape bed lifts for patient evacuation in hospitals - see FIRECODE Fire Practice Note 3 Escape Bed Lifts.

Worksheet 15
Communication Systems

Definition of Component

The capability for the early discovery of the fire and the alerting of the occupants to take appropriate action.

Method

The following factors should firstly be considered in terms of their ability to perform adequately as part of the overall fire alarm and detection system:-

FACTOR		MEASURE OF ADEQUACY
A. Automatic detection	:	Smoke or heat detectors provided throughout the patient area which activate the alarm system.
B. Manual detection	:	Adequate number of manual call points which activate the alarm system.
C. Communications with the fire brigade	:	Automatic link to fire brigade activated by automatic detection system or by manual call points. Other communications systems must be evaluated against this system (eg. telephone links, bleep systems).
D. Alarm systems	:	Audible alarm system operating throughout the patient area, with visual alarms where necessary.
E. Control panels	:	Provision of a central indicating and control panel, with sufficient repeater panels at points easily accessible for staff and fire brigade.
F. Maintenance	:	Maintenance and testing of all fire alarms and detectors carried out at prescribed intervals.

An assessment should now be made of the perceived adequacy of the communications systems, grade 5 being completely adequate in every respect and 0 being totally inadequate.

This component uses a similar form of assessment to Corridors (sheet 13) and involves the consideration not only of the facilities for detection and warning but also of the communication links. These links are equally important and should be carefully considered as any positive and accurate method of communication will reduce the preparation time for escape (ie the period between discovery of fire and action to avoid its consequences).

A system which conforms in full with Health Technical Memorandum 82 'Alarm and Detection Systems' will automatically attract a grade of 5.

Worksheet 16
Signs and Fire Notices

Definition of Component

A visual information and warning system.

Method

The following factors should be considered in terms of their adequacy, should a fire break out:-

FACTOR		MEASURE OF ADEQUACY
A. Location and number of signs	:	Sufficient number of fire exit, fire door, smoke door, fire point and fire alarm signs.
B. Location and number of fire notices	:	Sufficient number of fire notices and instructions.
C. Distinctiveness	:	Easily distinguishable from other signs and notices.
D. Comprehensibility	:	Easily understood and unambiguous with precise and accurate words and symbols.
E. Illumination	:	Suitable independent illumination of signs.
F. Height	:	Correct viewing height so that they can be read from the normal locations of staff and patients.

An assessment should now be made of the overall adequacy of the signs and fire notices based on these criteria and points awarded accordingly, 5 being completely adequate in every respect and 0 being totally inadequate.

In reaching your conclusions, you should bear in mind that factors A and B have the most significant contribution.

An important principle is that a sign should be visible, recognisable, readable and informative from any and all locations in the patient area. The distinctiveness, comprehensibility, illumination and height are to some extent secondary to the existence of appropriate signs. A system which conforms in full with Health Technical Memorandum No 65 (Signs) automatically attracts a score of 5.

Worksheet 17
Manual Fire Fighting Equipment

Definition of Component

First aid fire fighting appliances installed for the use of the occupants or the fire brigade.

Method

The following factors should firstly be considered in terms of their adequacy when fighting a fire:-

FACTOR		MEASURE OF ADEQUACY
A. Provision of extinguishers using water	:	1 x 9 litre (or 2 x 4.5 litre) for every 200 sq m of floor area. Minimum 2 per floor.
B. Provision of other extinguishers	:	Types and numbers as required.
C. Provision of hose reels	:	Sited so that no point in the patient area is more than 6m from the nozzle of an extended hose. Hoses not to exceed 30m in length.
D. Provision of fire blankets	:	Where needed.
E. Operation	:	Simple to use with uniform mode of operation, and capable of being used by a member of staff single handedly. Specially trained in-house fire fighting team also on call.
F. Maintenance	:	Maintenance and testing of all equipment carried out at prescribed intervals.

An assessment should now be made of the availability and capability of the manual fire fighting equipment, awarding grade 5 where considered completely adequate in every respect and grade 0 where considered totally inadequate.

This component requires the same method of assessment as Corridors (sheet 13) and evaluates the provision of extinguishers and hose reels of each type and their ease and consistency of operation. Under the 'operation' factor, the presence of a specially trained in-house fire fighting team must also be considered as this would prove an obvious advantage.

Worksheet 18
Escape Lighting

Definition of Component

Provision of minimum illumination necessary to enable persons to move within, and to escape from, the patient area in the event of the failure of normal lighting during a fire.

Method

Make an initial assessment based on the extent of lighting coverage as follows:-

Total coverage	= 4 to 5
All occupied areas	= 3 to 4
All escape routes	= 2 to 3
Only stairways	= 1 to 2
No coverage	= 0 to 1

This initial assessment can be modified depending upon your evaluation of the following factors:-

A. The intensity of illumination.
B. The reliability of the power supply.

It should be noted that stand-by generators alone do not constitute an ideal system; there must be some provision for independent illumination. Hand lamps would normally score 1 on initial assessment.

Worksheet 19
Automatic Suppression

Definition of Component

A method such as a water sprinkler system for the automatic suppression of fire in the patient area. (The special protection of hazardous areas is considered on sheet 6.)

Method

Make an initial assessment based on the area covered as follows:-

Total protection	= 4 to 5
All occupied spaces	= 3 to 4
Only corridors	= 2 to 3
Only unoccupied spaces	= 1 to 2
No coverage	= 0

This initial assessment can be modified depending upon your evaluation of the following factors:-

A. The suitability of the extinguishing medium (water is likely to be the most suitable for patient areas).

B. The suitability of the design.

C. The degree of maintenance.

This component is assessed in the same manner as Staff (sheet 1) but in this case the dominant factor is coverage and in the absence of any such provision the component should be rated as grade 0.

Whilst existing sprinkler systems in the patient area should be rated as indicated in this worksheet, it should be noted that the DHSS is currently developing a life safety sprinkler system for patient areas in hospitals. The relationship of such a system to other components of fire safety will need to be carefully assessed at the appropriate time. It is anticipated that a properly designed system will attract a higher percentage contribution to overall fire safety than the 3% allocated in paragraph 2.4.

Worksheet 20
Fire Brigade

Definition of Component

The fire fighting force controlled by the local authority.

This component requires the same form of assessment as Staff (sheet 1) but here the dominant element is the attendance time of the fire brigade for the particular building being surveyed.

Method

Make an initial assessment based on the attendance time as follows:-

0-5 mins	= 4 to 5
6-10 mins	= 3 to 4
11-15 mins	= 2 to 3
16-20 mins	= 1 to 2
over 20 mins	= 0 to 1

This initial assessment can be modified depending upon your evaluation of the following factors:-

A. The number of appliances and pre-determined first attendance.
B. The number of fire fighters available.
C. The familiarity of the fire fighters with the patient area.
D. How close vehicles can get to the patient area.
E. Any potential rescue problems (eg. bars on windows).
F. The water supply (wet risers, dry risers, external hydrants).

Appendix

Survey Summary Sheet (Example)

Health Authority :

Hospital :

Patient Area :

Floor Level(s)* :

Date of Survey :

Surveyed by :

Number and Type of Beds :

Component	Grade	Percentage Contribution	
1. Staff	0 1 2 3 4 5 x	9	=
2. Patient and Visitors	0 1 2 3 4 5 x	6	=
3. Factors Affecting Smoke Movement	0 1 2 3 4 5 x	7	=
4. Protected Areas	0 1 2 3 4 5 x	6	=
5. Ducts, Shafts and Cavities	0 1 2 3 4 5 x	4	=
6. Hazard Protection	0 1 2 3 4 5 x	7	=
7. Interior Finish	0 1 2 3 4 5 x	5	=
8. Furnishings	0 1 2 3 4 5 x	6	=
9. Access to Protected Areas	0 1 2 3 4 5 x	4	=
10. Direct Escape to Outside	0 1 2 3 4 5 x	4	=
11. Travel Distance	0 1 2 3 4 5 x	5	=
12. Stairways	0 1 2 3 4 5 x	5	=
13. Corridors	0 1 2 3 4 5 x	5	=
14. Lifts	0 1 2 3 4 5 x	3	=
15. Communication Systems	0 1 2 3 4 5 x	5	=
16. Signs and Fire Notices	0 1 2 3 4 5 x	4	=
17. Manual Fire Fighting Equipment	0 1 2 3 4 5 x	3	=
18. Escape Lighting	0 1 2 3 4 5 x	5	=
19. Automatic Suppression	0 1 2 3 4 5 x	3	=
20. Fire Brigade	0 1 2 3 4 5 x	4	=
	TOTAL SCORE (out of 500)		=

ADDITIONAL COMMENTS:

* For the purposes of this survey, any floor which has a direct access from an area situated at the same level to which the fire brigade vehicular access is available, should be considered to be at ground level.

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